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INVENTORS: Joseph Robert Stetter
William Roy Penrose

EXAMINER: Jeffrey R. Sney

SERIAL NO.: 09/860,449

ART UNIT: 1743

FILED: June 13, 2001

FOR: IMPEDANCE-BASED CHEMICAL AND BIOLOGICAL IMAGING SENSOR
APPARATUS AND METHODS

DECLARATION

I, the undersigned, William Buttner, residing at 607 W. 32nd Street, Chicago, IL 60616, hereby declare that:

- a) I am a Research Professor in the Biological, Chemical, and Physical Science Department at the Illinois Institute of Technology;
- b) I have more than twenty years of experience working in government laboratories, academia, and private industry developing various types of sensors for detecting a variety of chemical compounds and biological species;
- c) I am acquainted with patents numbered 6,114,862, issued to Tartagni et al, and 5,512,882 and 5,567,301, issued to Stetter et al, and with the pending claims 1-5, 7-14, and 27-30 of the above-identified patent application. I am also familiar with current and past efforts to develop the invention disclosed in said application.
- d) Based on my knowledge and expertise in the field of chemical and biological sensing and sensors, I hereby declare that none of these three patents anticipated this invention or the above-listed claims and none of these claims could have been obvious from the combination of these patents. In particular, it was not expected, based on Tartagni or Stetter, that a chip for imaging relatively large objects, such as human fingers, could detect minuscule molecules. No one could anticipate that a molecular level features that are more than 10,000 times smaller than a finger can intercept evanescent lines of capacitive force with sufficient disruption to measure with Tartagni's electronic circuitry. The layers need to be compatible with the chip surface and chemistry as well as with the electronics and physics of the detection. That this is possible and applicable to the measurement of molecular layers and events was a surprising result. The finding that the required resolution or sensitivity or selectivity for a practical assay in such a system can be achieved was both novel, and not anticipated by either Stetter or Tartagni until after they were put together. The fact is that until the discovery by Stetter and Penrose, no one in the fields of Tartagni or Stetter [including Tartagni and Stetter] have seen, published, or done this experiment. It was therefore not obvious to anyone up to the time of the invention.

Furthermore, it was far from obvious that the application of Stetter's layer to the Tartagni device would yield the results described in the disclosure which surpass by far anything that could have been expected a priori from such a combination.

e. Tartagni has produced a physical sensor, appertaining to the group of sensors which respond to pressure, temperature, force, stress, distance, and other physical variables, whereas Stetter and Penrose are disclosing a chemical and biochemical sensor that responds to molecules, molecular interactions, ion interactions, chemical and biochemical bonds and reactions. Not only are the forces and energy sources involved totally different, but so are the mechanism of operation and the origin of the signal. Tartagni gets an electrical output because of a bulk fingerprint placed near the surface. Stetter & Penrose obtain a signal because a specific surface layer at the molecular level attracts specifically a chemically distinguishable analyte [molecule, supramolecular structure, or cellular organism] that is chemically distinguishable from all other surrounding compounds in the matrix.

f. The adapted surface of Stetter & Penrose includes the simple physical shield of Tartagni plus a new layer to make it respond to the molecular component or analyte. It is both physically and functionally different. In this manner it is not taught nor even implied or envisioned by Tartagni. Stetter & Penrose found a surprising result in the fact that the physical sensor configuration of Tartagni has the potential for this novel, molecular-level modification and that the resulting sensitivity is sufficient to see even singular molecular or cellular events. In summary, Stetter & Penrose have made a truly novel modification and new discovery that the use of fringe field measurements in a system like Tartagni's can make exquisite biochemical and chemical measurements if modified with their invention.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 22nd day of February 2006.

William J. Buttner
William Buttner